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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/686,850	10/16/2003	Xingwei Wu	SMBZ 2 01013	1747

7590 09/17/2007

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EXAMINER	
ROY, SIKHA	

ART UNIT	PAPER NUMBER
2879	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

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Office Action Summary	Application No.	Applicant(s)	
	10/686,850	WU ET AL.	
	Examiner	Art Unit	
	Sikha Roy	2879	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *26 June 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-53,64 and 65* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-14,16-41,44,46,48,49,52,53,64 and 65* is/are rejected.

7)☒ Claim(s) *15,42,43,45,47,50,51* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on June 26, 2007 has been entered.

Claims 1-53 and 64,65 are pending in the instant application.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-5, 8-11,16-23,25,26,28-41,44, 46,52,53 and 64,65 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO 2004/032576 to Boerner et al. and in view of U.S. Patent 6,771,019 to Wu et al.

Regarding claim 1 Boerner discloses (Fig. 1 page 5 lines 1-20) a pixel substructure of a colored electroluminescent display comprising at least two sub-pixels,

each comprising a blue light emitting electroluminescent phosphor 3 and at least one photoluminescent phosphor layer 7 being associated with one of the blue sub-pixels such that the blue light emitted by each respective one of the sub-pixel is substantially absorbed by the associated photoluminescent phosphor layer thereby causing to emit colored light other than blue light. The examiner notes here that the recitation of ' for a thick film dielectric EL display' occurs in the preamble. A preamble is generally not accorded any patentable weight where it merely recites the purpose of a process or the intended use of a structure, and where the body of the claim does not depend on the preamble for completeness.

Boerner does not exemplify the blue EL phosphor as inorganic phosphor

Wu in same field of endeavor discloses (column 18 lines 56,57) use of inorganic strontium sulfide as blue phosphor. The selection of known material for its suitability for the intended use is within the skill of the art. Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to use inorganic electroluminescent phosphor for blue phosphor in the first layer of Boerner as suggested by Wu.

Regarding claim 2 Boerner discloses the pixel sub-structure comprises two sub-pixels and one photoluminescent phosphor (R in layer 7).

Regarding claim 3 Boerner discloses the sub-structure comprises three sub-pixels and a first and a second photoluminescent phosphor layer, the first photoluminescent phosphor layer emits red and second photoluminescent phosphor layer emits green other than the blue light.

Regarding claim 4 Boerner discloses each sub-pixel comprises a viewing side electrode 4 associated with the blue emitting EL inorganic phosphor layer and each photoluminescent phosphor layer (R in layer 7) is associated with the viewing electrode.

Regarding claim 5 Boerner discloses the pixel sub-structure comprises plurality of photoluminescent phosphor layers, each photoluminescent phosphor layer being associated with a different one of the sub-pixels.

Regarding claims 8 and 9 Wu discloses (Fig. 2 column 10 lines 31-34, column 13 lines 1-5) the pixel substructure comprising bandpass color filters 25a,25b disposed over the surface of the photoluminescent phosphor layers for achieving self-consistent optimization of luminosity.

Regarding claim 10 Boerner discloses the pixel sub-structure comprises three sub-pixels.

Regarding claim 11 Wu discloses the blue light emitting EL phoisphor is blue emitting alkaline earth sulfide.

Regarding claims 16, 17 Boerner discloses (page 6 Table 1) the photoluminescent phosphor layer comprises yellow, red emitting dyes.

Regarding claim 18,19 Boerner discloses the photoluminescent phosphor is an inorganic photoluminescent powder such as rare earth activated alkaline earth sulfide CaS: Ce.

Regarding claims 20-22 Boerner discloses (page 6 line 20) the inorganic phostoluminescent powder is an inorganic semiconductor material, quantum dots (nanocrystalline) like CdS, CdSe.

Regarding claim 23 Boerner discloses the claimed invention except for the limitation of size of the crystals in the range 10-200 Angstroms. It has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233. It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide size of the crystals in the range 10-200 Angstroms, for providing desired color, since optimization of workable ranges is considered within the skill of the art.

Regarding claim 25 Boerner discloses at least one thin dielectric layer on the surface of blue light emitting EL phosphor layer.

Regarding claim 26 Boerner discloses the display further comprises a transparent cover plate (capping layer) 6 wherein at least one photoluminescent phosphor is adhered to.

Regarding claim 28, Boerner discloses (Fig. 1) each photoluminescent phosphor layer is disposed on the viewing side electrode of respective sub-pixels.

Regarding claim 29 Boerner discloses (Fig. 1) the pixel sub-structure comprises photoluminescent phosphor layer disposed on an optically transparent barrier layer 5, the barrier layer 5 is disposed on the viewing side electrode 4.

Regarding claim 30, Boerner discloses the claimed invention except for the limitation of thickness of the photoluminescent phosphor layer being between 1 to 10 microns. It has been held that where the general conditions of a claim are disclosed in

the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPQ 233. It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide photoluminescent phosphor layer of suitable thickness between 1 and 10 microns, for providing desired color, since optimization of workable ranges is considered within the skill of the art.

Regarding claim 31 Boerner and Wu disclose all the limitations same as of claim 1 and additionally Boerner discloses each pixel comprising a thick dielectric layer 5 (Fig.1) associated with pixel substructure.

Claims 32-35 essentially recite the same limitations of claims 2-5 respectively and hence are rejected for the same reasons (see rejections of claims 2-5).

Regarding claim 36 Boerner discloses each photoluminescent phosphor layer associated with a different viewing side electrode 4.

Regarding claims 37 and 38 Boerner discloses each sub-pixel comprising a viewing electrode associated with a blue light emitting EL phosphor layer.

Regarding claim 39 Boerner discloses (fig. 1) a substrate, a row electrode 2 and the pixel sub-structure.

Boerner is silent about a thick dielectric layer formed in sequence between the row electrode and the pixel sub-structure.

Wu discloses (fig. 6) a thick film dielectric layer 18 between row electrode and the pixel sub-structure. Wu discloses (column 5 lines 1-7) this configuration provides uniform luminosity in an EL laminate.

Therefore it would have been obvious to one of ordinary skill in the art at the tim ethe invention was made to include the thick dielectric layer between row electrode and the pixel sub-structure as disclosed by Wu in the display of Boerner for providing uniform luminosity in the display.

Regarding claim 40 Boerner discloses the same limitations for method of making pixel substructure as of claim 1 and hence is rejected for the same reason.

Claim 41 essentially recites the method of making EL display with same limitations as of claim 3 and hence is rejected for the same reason.

Regarding claim 44 Boerner discloses the display further comprises a transparent cover plate (capping layer) 6 wherein at least one photoluminescent phosphor is adhered to.

Regarding claim 46 Boerner discloses the method comprising coating the photoluminescent phosphor layer 7 with an optically transparent passivating layer 6.

Regarding claims 52 and 53 Boerner discloses the pixel substructure comprising at least two photoluminescent phosphors.

Regarding claim 64 Boerner discloses (Fig. 1 page 5 lines 1-20) a pixel substructure of a colored electroluminescent display comprising at least two sub-pixels, each comprising a blue light emitting electroluminescent phosphor 3 and at least one photoluminescent phosphor layer 7 being associated with one of the blue sub-pixels such that the blue light emitted by each respective one of the sub-pixel is substantially absorbed by the associated photoluminescent phosphor layer thereby causing to emit

colored light other than blue light, two viewing side electrodes 4 associated with the blue emitting electroluminescent phosphor layer. Boerner discloses each pixel comprising a thick film dielectric layer 5 associated with the pixel structure.

Boerner does not exemplify the blue EL phosphor as inorganic phosphor.

Wu in same field of endeavor discloses (column 18 lines 56,57) use of inorganic strontium sulfide as blue phosphor. The selection of known material for its suitability for the intended use is within the skill of the art. Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to use inorganic electroluminescent phosphor for blue phosphor in the first layer of Boerner as suggested by Wu.

Regarding claim 64 Boerner discloses (Fig. 1) a substrate, a row electrode 2 and the pixel sub-structure.

Boerner is silent about a thick dielectric layer formed in sequence between the row electrode and the pixel sub-structure.

Wu discloses (Fig. 6) a thick film dielectric layer 18 between row electrode and the pixel sub-structure. Wu discloses (column 5 lines 1-7) this configuration provides uniform luminosity in an EL laminate.

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to include the thick dielectric layer between row electrode and the pixel sub-structure as disclosed by Wu in the display of Boerner for providing uniform luminosity in the display.

Claims 6, 7 and 48 are rejected under 35 U.S.C. 103(a) as being obvious over WO 2004/032576 to Boerner et al. and U.S. Patent 6,771,019 to Wu et al. and further in view of U.S. Patent 6,469,435 to Seibold et al.

Regarding claim 6 Boerner and Wu do not disclose explicitly a reflecting layer associated with photoluminescent phosphor layer.

Seibold in pertinent art discloses (Fig. 1c column 4 lines 56-61) a reflective layer 62 under the phosphor layer 63. It is noted that the reflective layer increases the luminosity of light transmitted.

Therefore it would have been obvious tone of ordinary skill in the art at the time of invention to include a reflecting layer as taught by Seibold associated with one photoluminescent layer of Boerner and Wu for increasing the luminosity of transmitted light.

Regarding claim 7 Boerner, Wu and Seibold discloses a reflecting layer disposed on one surface of the photoluminescent layer.

Claim 48 essentially recite the same limitation of claim 7 for the method of making the pixel sub-structure and hence is rejected for the same reason.

Claims 12 – 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO 2004/032576 to Boerner et al. and U.S. Patent 6,771,019 to Wu et al., and further in view of U.S. Patent Application Publication 2002/0122895 to Cheong et al.

Regarding claim 12 Wu does not exemplify the blue emitting rare earth activated alkaline earth sulfide being selected from the group consisting of rare earth activated alkaline earth thioaluminates, rare earth activated alkaline earth thiooxyaluminates, rare earth activated alkaline earth thiogallates.

Cheong in the same field of endeavor discloses (section [0008]) blue phosphor material including europium activated barium thioaluminate. Cheong discloses this phosphor provides excellent blue color coordinates and higher luminance.

Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to substitute rare earth activated alkaline earth sulfide of Wu by europium activated barium thioaluminate as taught by Cheong for providing excellent blue color coordinates and higher luminance.

Regarding claim 13 Cheong discloses the blue emitting rare earth activated alkaline earth sulfide is europium activated barium thioaluminate.

Regarding claim 14 Cheong discloses the blue phosphor film with relatively high energy conversion efficiency with CIE color coordinates x=0.13 and y=0.10.

Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over WO 2004/032576 to Boerner et al. and U.S. Patent 6,771,019 to Wu et al. and further in view of WO 99/16847 to Burns et al.

Regarding claim 24 Boerner is silent about the polymer matrix can be PMMA.

Burns in relevant art of fluorescent dye blends discloses (page 5 lines 13-25) use of dyes such as green, yellow light emitting dye in polymer matrix PMMA which absorbs light at a first wavelength and emits a second wavelength which is longer than the first wavelength. Burns further teaches these dyes add hue and chroma to the color of light emitted.

Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to include green, yellow light emitting dyes in the photoluminescent layer of Wu as taught by Burns to provide emission of light with longer wavelength and desired hue and chroma.

Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over WO 2004/032576 to Boerner et al. and U.S. Patent 6,771,019 to Wu et al., and further in view of U.S. Patent 5,909,081 to Eida et al.

Regarding claim 27 Boerner discloses (Fig.2)the photoluminescent phosphor adhered to the outer surface of the cover plate.

Boerner is silent about at least one phosphor layer coated with optically transparent passivating layer.

Eida in pertinent art of multicolor emission display discloses (Fig. 2 column 25 lines 25-40) phosphor layer 3 disposed on the outer surface of the substrate 4 and a transparent passivating layer disposed on the phosphor layer. This passivating layer acts as protecting layer preventing deterioration of the phosphor.

Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to include a passivating layer disposed on the photoluminescent phosphor adhered outside the cover plate of Boerner and Wu as taught by Eida for preventing exposure with outside and hence any deterioration of the phosphor.

Allowable Subject Matter

Claims 15, 42,43,45,47,50 and 51 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Regarding claim 15 the prior art of record neither teaches nor suggests a pixel sub-structure having all the limitations as claimed and particularly the photoluminescent phosphor layer being insulating material with band gap energy less than that of the blue light emitting photon.

Regarding claim 42 the prior art of record neither teaches nor suggests a method of making a pixel sub-structure with the limitations as claimed and particularly disposing viewing electrodes over blue light-emitting inorganic phosphor layer and then disposing photoluminecent phosphor layer over the viewing electrode.

Claims 43,45 and 47 would be allowable for the same reason because of their dependency status from claim 42.

Regarding claims 50 and 51 the prior art of record neither teaches nor suggests a pixel sub-structure with the limitations as claimed and particularly a transparent cover plate disposed over the optically transparent sheet such that an air gap is formed

between the optically transparent sheet and the optically transparent cover plate with one photoluminescent phosphor layer in between.

Response to Arguments

Applicant's arguments filed December 5, 2006 have been fully considered but they are not persuasive.

In response to applicant's argument regarding claim 1, that there is no suggestion to combine the references of Wu and Boerner, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988)and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, Wu discloses (column 3 lines 24-30) inorganic phosphors consisting of host material (usually a compound of a Group II element with a Group VI element or a thiogallate compound) and a dopant useful in electroluminescent displays are well known. Wu teaches typical phosphors include zinc sulfide or strontium sulfide with a dopant or activator. The selection of known material for its suitability for the intended use is within the skill of the art. Therefore it would have been obvious to one of ordinary skill in the art at the time of invention to use inorganic electroluminescent phosphor for blue phosphor in the first layer of Boerner as suggested by Wu.

In response to applicants' argument regarding claim 1, that Boerner is directed to DC electroluminescent device, the Examiner respectfully submits that nowhere in Boerner '**DC electroluminescent display**' is disclosed. The Applicant alleges that electrical and optical properties of DC electroluminescent displays are different than those of AC electroluminescent displays. Claims in the instant application do not recite the limitation of 'AC electroluminescent display'. Regarding applicant's allegation that in DC electroluminescent displays light is outputted through transparent cathode the Examiner points to Fig. 2 of Wu where also light is emitted through transparent second electrode 24. The Applicant contends that Wu teaches use of ZnS:Mn, SrS:Ce in conjunction with optical filter the Examiner disagrees. Wu teaches (claim 20) these inorganic phosphors are used in pixels for emitting red, green and blue light.

Regarding claim 31 the limitation of thick dielectric layer the applicant argues that those dielectric layers of Boerner are transparent and it is known that the thick film dielectric layers are not transparent. In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., **non-transparent thick film dielectric layer**)) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). Furthermore the Examiner submits that the claim limitation not reciting any particular thickness of the dielectric layer, the stack of 2n+1 dielectric layers 5 associated with each sub-pixel is

considered as thick dielectric layer and hence Boerner discloses each pixel comprising a thick dielectric layer 5 associated with pixel substructure.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sikha Roy whose telephone number is (571) 272-2463. The examiner can normally be reached on Monday-Friday 8:00 a.m. – 4:30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimeshkumar D. Patel can be reached on (571) 272-2457. The fax phone number for the organization is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Sikha Roy
Sikha Roy
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